Geophysical Research Abstracts
Vol. 16, EGU2014-10363-1, 2014
EGU General Assembly 2014


# Model simulation of the perturbation of the Mars atmosphere by the near-collision Comet C/2013 A1 (Siding Spring)

Roger V. Yelle (1), Arnaud Mahieux (1,2), Sarah Morrison (1), Véronique Vuitton (3), and Sarah M. Hörst (4)

(1) Department of Planetary Science, University of Arizona, 1629 E. University Blvd, Tucson, AZ 85721, (2) IASB - BIRA, Atmosphere, Brussels, Belgium (arnaud.mahieux@aeronomie.be, +32 23730426), (3) Institut de Planétologie et d'Astrophysique de Grenoble, Université J. Fourier, Grenoble, France, (4) Cooperative Institute for Reasearch in Environmental Sciences, University of Colorado, Boulder, CO

The Mars upper atmosphere could be strongly perturbed by the near-collision with Comet C/2013 A1 (Siding Spring), which will have its closest approach to the Planet Mars on October 19, 2014, at a distance between 116,000 and 169,000 km. Significant mass and energy will be deposited in the upper atmosphere if the comet coma is significantly dense. Using a 1-D model, we predict that comet $H_2O$ production rates larger than $10^{28}$ molecules/s will produce temperature increase exceeding 30 K above 170 km that will last for a few hours. The H density will be multiplied by a factor close to 2 above 140 km and the perturbation will persist during tens of hours after the closest encounter. Drag on orbiting spacecraft may increase by substantial factors, depending on the comet activity, because of the thermal perturbation of the atmosphere. Observation of these perturbations may provide insight into the thermal and chemical balances of the atmosphere.